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(58) Field of search

H4K

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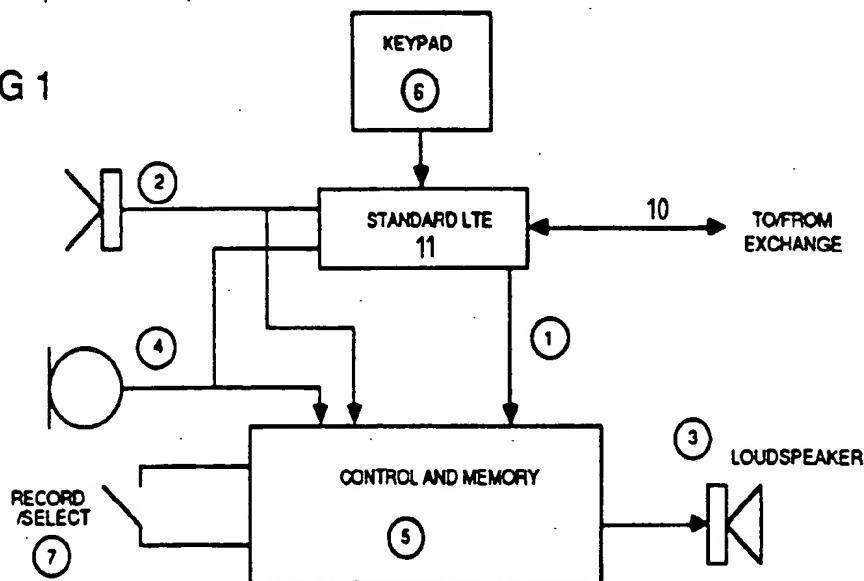
## (54) Ringing indicator

(57) A ringing indicator for connection to a telecommunications line 10 comprises means responsive to an incoming ringing signal on the line to produce an audible signal which comprises a previously stored message. The message is preferably a voiced message and may correspond to the number of the line/telephone—"2767", or may be the name of the 'phone's user—"Jim's 'phone".

In one embodiment of the invention a non-volatile memory 5 holds the numbers 0 to 9 in digitised speech. The user of the telephone keys in the number sequence appropriate for that telephone—ie 2767, and that sequence, stored in RAM, determines the numbers which are read out when the 'phone rings.

In another embodiment, users can store their own voiced messages or other sounds (a dog's bark) by means of the telephone's microphone.

FIG 1



The drawing(s) originally filed was/were informal and the print here reproduced is taken from a later filed formal copy.

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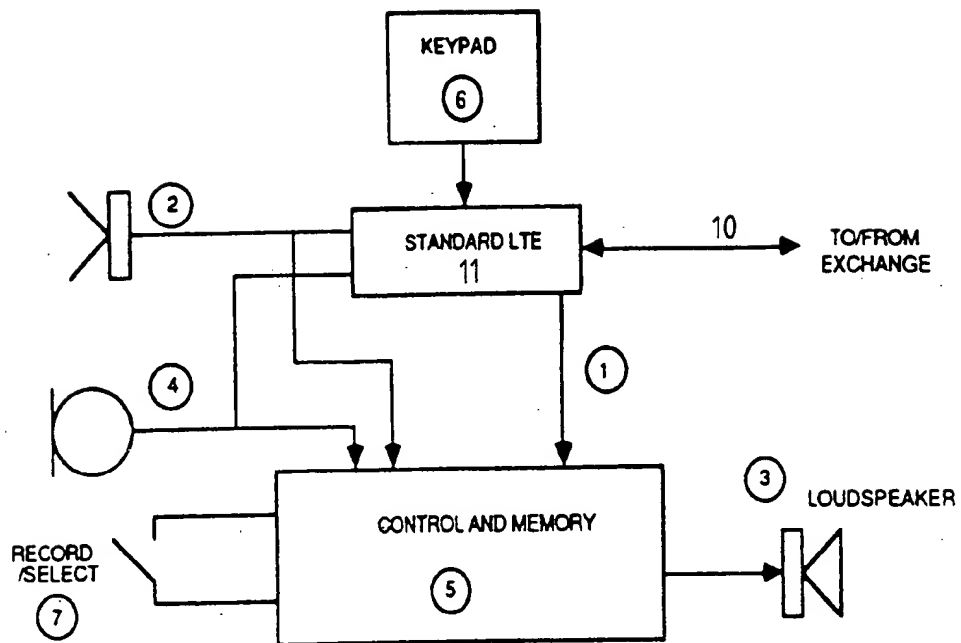


FIG 1

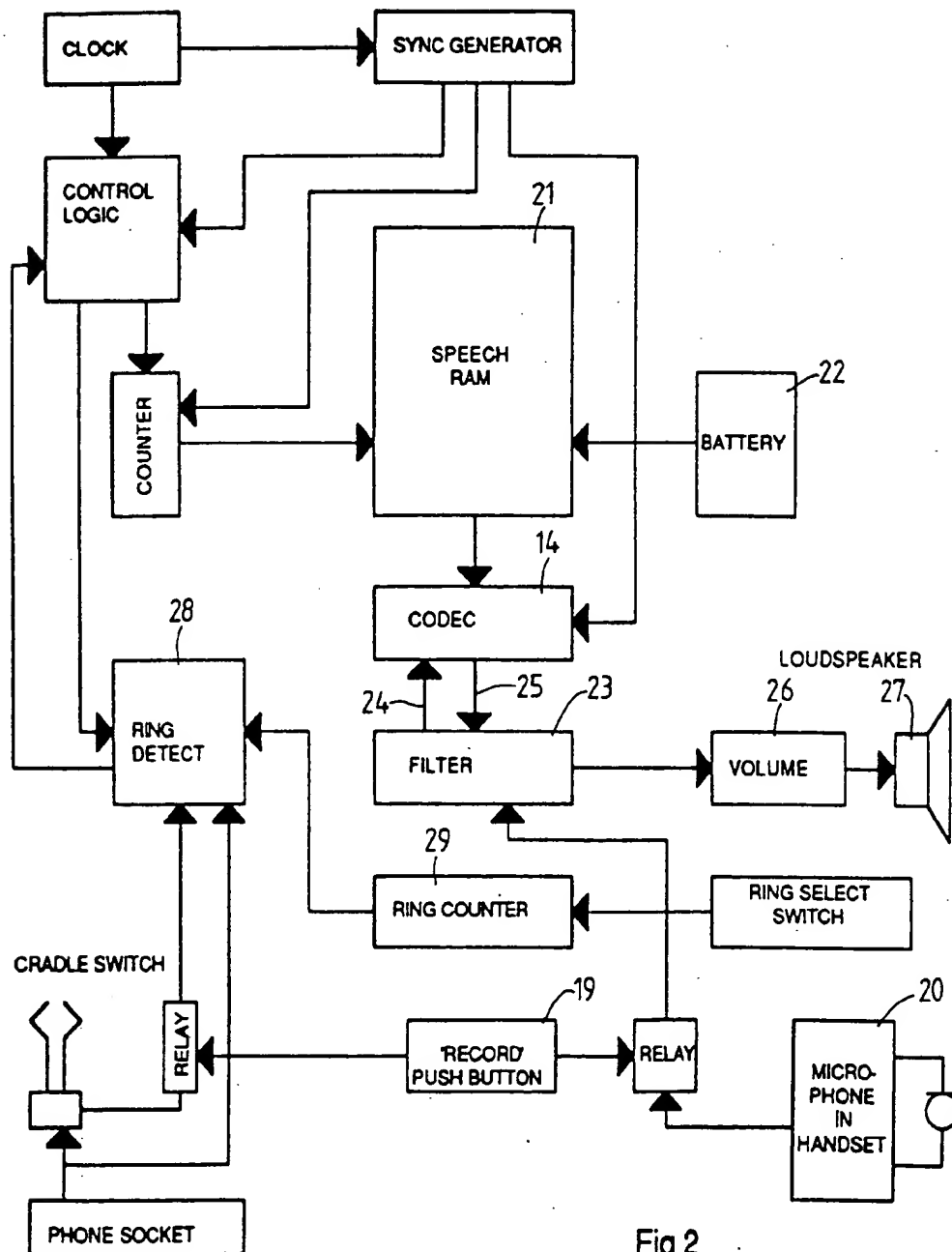


Fig 2

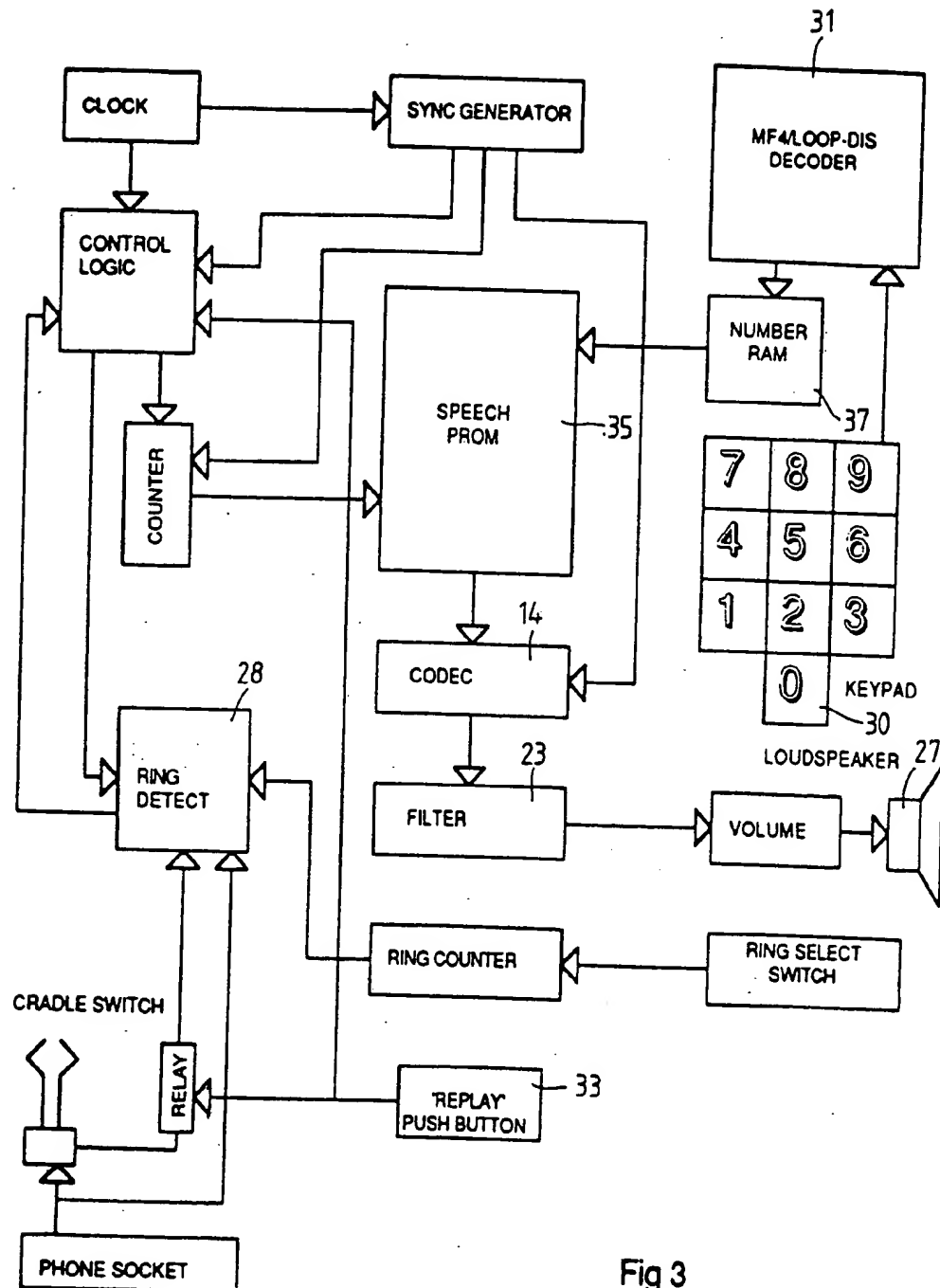


Fig 3

## SPECIFICATION

### Ringing indicator

5 The present invention relates to ringing indicators for connection to telecommunications networks, and in particular but not exclusively to telephone instruments incorporating such ringing indicators.

10 A problem well known to those unlucky enough to share an office with several telephones is how to identify, when a call is received, which telephone is actually ringing. Failure to speedily identify which telephone is ringing can result in the caller hanging up before the call is taken.

In the case where all the telephones are extensions from a private automatic branch exchange (PABX), a partial solution is to provide the facility known as "direct extension pick up"—whereby a ringing extension can be answered from another extension. However, to use this facility the number of the ringing extension must be known—leaving the problems of identifying which extension is ringing and of remembering its number. These problems can be alleviated by incorporating all the relevant extensions in a group and employing the facility of "group pick-up". This facility enables any extension in the group to answer another ringing extension in the group without knowing the extension number.

The problem with group pick-up is that the person who intercepts the call invariably quotes the number of their own extension and not that of the ringing extension. This, understandably, confuses the caller, especially if the call is an external one coming into the PABX. Frequently the result of the confusion is that the caller terminates the call in the belief that they have a wrong number.

The present invention seeks to provide a solution to these problems. By means of it, each telephone in an office can be provided with its own unique calling tone. In its simplest form, the calling tone could be just a voiced message interrupting the ringing of the phone, the voiced message consisting of the extension number eg "2767", or the name of the owner of the telephone, eg "Ian's phone".

According to the present invention there is provided a ringing indicator for connection to a telecommunications line, comprising means responsive to an incoming ringing signal on said line to produce an audible signal, characterised in that said audible signal comprises a previously stored message.

Embodiments of the invention will now be described by way of example only with reference to the accompanying drawings, in which:

Figure 1 is a functional block diagram of a telephone according to the present invention;

Figure 2 is a functional block diagram of a telephone which enables the user to record a

personalised message;

Figure 3 is a functional block diagram of a telephone which differs from that of Figure 2 in only offering the facility to replay messages, but not to record them.

In Figure 1 a line 10 from an exchange (public or PABX) is terminated with standard line terminating equipment (LTE) 11. On detection of an incoming call, the control and memory circuitry 5 replays a stored message via the telephone ringer or warbler 2, or a separate loudspeaker 3. Users of the telephone can produce their own messages by using the telephone microphone 4, the new message replacing or modifying previously stored messages in the memory. The memory can be arranged to store a few short messages, selectable by means of the telephone's keypad. An additional switch 7 or one of the switches of the keypad 7 is used to enter the "record or select" mode.

The length of message which can be used is dependent on how much memory can be provided. However, for a four digit extension number a message duration of at least 2-3 seconds would probably be required. The amount of memory required is also dependent on the encoding technique employed. If standard 8-bit A-Law encoding is used, 8 Kbytes of memory would be required for each second of speech. However, if some form of speech synthesis is used, the amount of memory required could be reduced considerably.

Figure 2 is a functional block diagram of a telephone which enables the user to record a personalised message. The message would be recorded using the microphone 20 in the telephone's handset and stored in the random access memory (RAM) 21. The RAM21 has battery 22 backup to prevent loss of the stored information in the event that the telephone is disconnected from the line. The remainder of the circuitry is powered from the line.

In the record mode the handset microphone 20 is connected to an anti-aliasing filter 23. The analogue output 24 from the filter is continually sampled by an analogue-to-digital converter (ADC) or codec 14 and the resultant digitised data is passed to the RAM21 where it is stored cyclically.

The stored message can be checked by operation of the relevant button or switch to flag the control logic to play the message. The control logic reads the data from the RAM21 and passes it to the digital-to-analogue converter (DAC) or codec 14. The analogue output 25 from the codec passes via the filter 23 to the amplifier 26 and loudspeaker 27.

As with other embodiments of this invention, conventional ringing can be suppressed altogether, the recorded message being output as soon as ringing current is detected by detector 28, or a predetermined number of conventional ringing/warbling cycles may precede the replay of the message. Where a predeter-

mined number of ring cycles are to appear before the message, the number of ring cycles is counted by ring counter 29. When the ringing has occurred for the period determined by the 'ring select' control a flag instructs the control logic to play the message as described in the previous paragraph.

The protocol governing message recording in one example of this telephone is as follows.

- 10 To place the telephone in record mode the 'record' push button 19 is operated and the handset lifted. This disconnects the handset from the telephone line but leaves the remainder of the telephone circuit connected so that
- 15 incoming calls can still be received. Once the handset is lifted the 'record' push-button is released. To record the message the user speaks while the 'record' push-button is held depressed. At the end of the message the
- 20 push-button is again released, with the message now held in the memory. To reconnect the handset and leave record mode the cradle switch must be reset, usually by replacing the handset after the recording session.

- 25 Figure 3 is a functional block diagram of variation on the telephone represented in Figure 2. This telephone speaks only the extension number and does not have the facility to produce other voiced messages.

- 30 All the digits (0-9) are stored in digital form (such as in the A-law format mentioned above) in a programmable read only memory (PROM) 35 or other suitable non-volatile memory.

- 35 When the user wishes to store a new message the telephone's keypad 30 is used to select the digits making up the telephone's number. The digits keyed are decoded by the MF4/loop disconnect signalling decoder 31
- 40 and stored in a RAM32. If desired the RAM32 can be provided with a battery back-up to protect its contents while the telephone is disconnected from the line.

- 45 The protocol governing message generation and replay is as follows. To select the extension number the 'select/reply' push button 33 is operated and the handset left on the telephone. While the push button is held down the numbers that are to be spoken are selected (in the order in which they are to be
- 50 spoken) by using the keypad's digit keys. When the message is finished the select/replay button is released. To play the message the handset is lifted and the 'select/replay'
- 55 button operated, this sends the first digit in RAM32 to the control logic. The control logic then reads the data stored in PROM35 and the analogue signal for the loudspeaker produced as detailed above.

- 60 The ringing indicator according to the present invention need not, of course, actually be incorporated in a telephone, but could, for example, be produced as a self-contained accessory for use with existing telephones. Such
- 65 a unit could be provided with the appropriate

plug and socket to enable it to be introduced between a telephone and its line jack unit. To enhance the appeal of the ringing indicator as an accessory, the amount of memory may usefully be increased to allow extended messages to be stored. As with the other embodiments of the invention. The message can take any form and need not be restricted to digits or even the spoken word—music or a dog's bark or other animal noises could be used instead.

- 70 Furthermore, the invention also has application to other items of telecommunications equipment where it would be useful to be able to distinguish calls received on different lines or units. Other applications include key and lamp units and operator consoles.
- 80

- 85 The call indicator according to the invention is preferably powered from the line to which it is connected.

The circuit could quite easily be implemented as a VLSI chip, reducing both size and power consumption.

- Although the present invention as above described does not rely on the use of a speech synthesiser to 'read' the stored messages, those skilled in the art will appreciate that the use of speech synthesis could increase the flexibility of the call indicator as well as reducing the amount of memory needed to store the messages. As the price of providing "artificial voices" using speech synthesis continues to fall (it is already possible to provide speech synthesis for as little as about £10 using Texas Instruments "Speak and Spell") it is likely that the use of synthesis in the present invention will become increasingly more attractive. Indeed, since speech synthesisers are based largely on suitably programmed micro-processors, the essentials of a speech synthesiser are already present in most "facility" telephones.
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#### CLAIMS

- 110 1. A ringing indicator for connection to a telecommunications line, comprising means responsive to an incoming ringing signal on said line to produce an audible signal, characterised in that said audible signal comprises a previously stored message.
- 115 2. A ringing indicator as claimed in claim 1 wherein memory means are provided to store said message, further means being provided to enable the input of said message into said memory means.
- 120 3. A ringing indicator as claimed in claim 2 wherein digitiser means are provided to digitise said message prior to its being input into said memory means.
- 125 4. A ringing indicator as claimed in claim 1 wherein first memory means are provided to store a plurality of message elements, second memory means being provided to store instructions to control the inclusion in the message of those message elements comprised in
- 130

said message.

5. A ringing indicator as claimed in claim 4, wherein said first memory means comprises a non-volatile memory and said second memory
- 5 means comprises a volatile memory.

6. A ringing indicator as claimed in claim 4 or claim 5 wherein the message elements stored in said first memory means comprise voiced signals for each of the digits 0 to 9.
- 10 7. A telephone comprising a ringing indicator as claimed in any one of the preceding claims.

8. A ringing indicator substantially as hereinbefore described with reference to and as illustrated in any one of the accompanying
- 15 drawings.

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